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APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
10/808,333	03/25/2004	Kazuhito Tsukagoshi	2870-0277PUS1	5434

2292 7590 12/24/2009

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EXAMINER	
QUACH, TUAN N	

ART UNIT	PAPER NUMBER
2893	

NOTIFICATION DATE	DELIVERY MODE
12/24/2009	ELECTRONIC

Please find below and/or attached an Office communication concerning this application or proceeding.

The time period for reply, if any, is set in the attached communication.

Notice of the Office communication was sent electronically on above-indicated "Notification Date" to the following e-mail address(es):

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Office Action Summary	Application No.	Applicant(s)	
	10/808,333	TSUKAGOSHI ET AL.	
	Examiner	Art Unit	
	Tuan N. Quach	2893	

-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE *3* MONTH(S) OR THIRTY (30) DAYS, WHICHEVER IS LONGER, FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

Status

1)☒ Responsive to communication(s) filed on *September 1, 2009*.

2a)☒ This action is **FINAL**. 2b)☐ This action is non-final.

3)☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

Disposition of Claims

4)☒ Claim(s) *1,2 and 20-31* is/are pending in the application.

4a) Of the above claim(s) *20,25,29 and 31* is/are withdrawn from consideration.

5)☐ Claim(s) _____ is/are allowed.

6)☒ Claim(s) *1,2,21-24,26-28 and 30* is/are rejected.

7)☐ Claim(s) _____ is/are objected to.

8)☐ Claim(s) _____ are subject to restriction and/or election requirement.

Application Papers

9)☐ The specification is objected to by the Examiner.

10)☒ The drawing(s) filed on *25 March 2004* is/are: a)☒ accepted or b)☐ objected to by the Examiner.

Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).

Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).

11)☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

Priority under 35 U.S.C. § 119

12)☒ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).

a)☒ All b)☐ Some * c)☐ None of:

1.☒ Certified copies of the priority documents have been received.

2.☐ Certified copies of the priority documents have been received in Application No. _____.

3.☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).

* See the attached detailed Office action for a list of the certified copies not received.

Attachment(s)

1) ☒ Notice of References Cited (PTO-892)
2) ☐ Notice of Draftsperson's Patent Drawing Review (PTO-948)
3) ☐ Information Disclosure Statement(s) (PTO/SB/08) Paper No(s)/Mail Date _____.
4) ☐ Interview Summary (PTO-413) Paper No(s)/Mail Date. _____ .
5) ☐ Notice of Informal Patent Application
6) ☐ Other: _____.

DETAILED ACTION

Claims 1 and 2 are amended, claims 3-19 are canceled. New claims 22-31 are added. Initially, note that claims 25, 29, 31, correspond to the organic material having a six-membered ring works as a channel and the carbon nanotube has higher electroconductivity than the channel (claim 25), including the contact length between the channel and the carbon nanotube to be 10 micron or less (claim 29), and wherein the contact length between the channel and the carbon nanotube is 1 to 10 micron (claim 31), these claims correspond to similar structure regarding the channel in the device to be an organic material having a six-membered carbon ring; these claims thus require the channel in the claims of species 2 in Paper 0206 mailed 03/01/2006 and thus the device therein, and thus would have been grouped with claims 3-19. See the channel delineated in claim 3 lines 2-3, claim 4 lines 2-3. Since applicant has received an action on the merits for the originally presented invention in the elected species including claims 1, 2, 21, this species has been constructively elected by original presentation for prosecution on the merits. Accordingly, claims 25, 29, 31 are withdrawn from consideration as being directed to a non-elected species. See 37 CFR 1.142(b) and MPEP § 821.03. Thus of the pending claims, claims 1, 2, 21, and new claims 22-24, 26, 27, 28, and 30 are examined; new claims 25, 29, 31 are withdrawn from consideration.

The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

> (a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the

> subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negatived by the manner in which the invention was made.

This application currently names joint inventors. In considering patentability of the claims under 35 U.S.C. 103(a), the examiner presumes that the subject matter of the various claims was commonly owned at the time any inventions covered therein were made absent any evidence to the contrary. Applicant is advised of the obligation under 37 CFR 1.56 to point out the inventor and invention dates of each claim that was not commonly owned at the time a later invention was made in order for the examiner to consider the applicability of 35 U.S.C. 103(c) and potential 35 U.S.C. 102(e), (f) or (g) prior art under 35 U.S.C. 103(a).

Claims 1, 2, 21, and 23 are rejected under 35 U.S.C. 103(a) as being unpatentable over Awano in view of Webster.

Re claims 1 and 21, Awano 7,084,507 teaches device formation of wiring structure including metal and an intervening carbon nanotube where the metal , e.g., drain electrode 222, contacts the carbon nanotube, e.g., 220a and wherein the carbon nanotube is in contact with the component regions in substrate 202 and wherein the semiconductor material 202/204 and the metal, e.g., 222, do not directly contact each other. The carbon nanotube thus is employed for connection to device elements as well for interconnection between the device elements. The advantages include improved reliability, good migration resistance, improved device characteristics among others.

See the abstract, Fig. 19C, column 3 line 31 to column 4 line 45, column 6 lines 30-58, column 9 lines 21-36, column 17 line 13-54.

Regarding the newly added limitation in claim 1, namely wherein the carbon nanotube comprises 6-membered rings, and regarding the limitation in claim 21, wherein the carbon nanotube comprises 6-membered carbon ring in contact with the 6-membered carbon ring of the organic material, Awano is applied as above and further teaches carbon nanotube to comprise 6-membered rings, column 6 lines 32-34.

Awano as applied above regarding the semiconductor material to be contacted is not limited to silicon, or any particular semiconductor material (e.g., column 23 line 53, column 24 line 62), but does not explicitly recite the use of the semiconductor material in which the device component being formed to include organic semiconductor material having a 6-membered carbon ring.

Webster (Wiley Encyclopedia of Electrical and Electronics Engineering, John Wiley & Sons, 1999, vol. 15, pp. 419, 429-434) teach organic materials including conjugated polymers, pentacene, thiopene, which comprise 6 carbon ring, see, e.g., instant specification page 12 lines 1-11 regarding similar organic materials) as conventional semiconductor materials having semiconducting properties and high electronic conductivity that can be prepared by simple fabrication. The organic materials are further taught to be light weight, flexible, conformable and are produced by simple manufacturing technologies which make them potentially very inexpensive compared to inorganic semiconductor materials. See page 419, left column, lines 21 to last line. Further advantages of organic materials and their applications to

semiconductor devices are delineated, tunablility of electronic bandgap, processability of the materials on a large scale, substantial reduction of production cost. The various organic materials including anthracene, fullerene, etc., which comprise 6 carbon membered ring, see instant specification, page 12 lines 1-11, regarding similar materials). See page 429, right column.

It would have been obvious to one skilled in the art in practicing Awano invention to have employed as the semiconductor material organic semiconductor materials including 6-membered ring as taught in Webster since such use is conventional and advantageous as documented by Webster as delineated above, including organic materials having semiconducting properties and high electronic conductivity that can be prepared by simple fabrication, and include further advantages such as light weight, flexible, conformable and are produced by simple manufacturing technologies which make them potentially very inexpensive compared to inorganic semiconductor materials, tunablility of electronic bandgap, processability of the materials on a large scale, substantial reduction of production cost, among others. Additionally, regarding the newly amended claim 1 and re claim 21, the use of carbon nanotube comprising six-membered carbon ring is conventional and obvious as evidenced by Awano above, the contact between the carbon nanotube six-membered rings and the 6-membered ring of the organic semiconductor would logically follow when the respective materials are employed and in contact.

Re claim 2, which corresponds to the same limitations in claim 1, with the intended use or application to TFTs in claim 2 would have been apparent given the

scope of the structures in Awano, which shows field effect transistors, and in any event, is unpatentable as a preamble is generally not accorded any patentable weight where it merely recites the purpose of a process or the. intended use of a structure, and where the body of the claim does not depend on the preamble for completeness, but instead, the process steps or structural limitations are able to stand alone. See In re Hirao, 535 F.2d 67, USPQ 15 (CCPA 1976) and Kropa v. Robie, 187 F.2d 150, 152, 88 USPQ 478, 481 (CCPA 1951).

Re claim 23 concerning wherein the metal and the carbon nanotube form electrode, this corresponds to an intended use or functional limitation and does not require any additional structural limitations on the claimed apparatus. A recitation directed to the manner in which a claimed apparatus is intended to be used does not distinguish the claimed apparatus from the prior art – if the prior art has the capability to so perform. See MPEP 2114 and *Ex parte Masham,* 2 USPQ2d 1647 (1987). The recitation of a new intended use for an old product does not make a claim to that old product patentable. *In re Schreiber*, 44 USPQ2d 1429 (Fed. Cir. 1997). The recitation of a new intended use for an old product does not make a claim to that old product patentable. *In re Schreiber*, 44 USPQ2d 1429 (Fed. Cir. 1997). While features of an apparatus may be recited either structurally or functionally, claims directed to an apparatus must be distinguished from the prior art in terms of structure rather than function. In re Schreiber, 128 F.3d 1473, 1477-78, 44 USPQ2d 1429, 1431-32 (Fed. Cir. 1997) (The absence of a disclosure in a prior art reference relating to function did not defeat the Board's finding of anticipation of claimed apparatus because the

limitations at issue were found to be inherent in the prior art reference); see also In re Swinehart, 439 F.2d 210, 212-13, 169 USPQ 226, 228-29 (CCPA 1971); In re Danly, 263 F.2d 844, 847, 120 USPQ 528, 531 (CCPA 1959). “[A]pparatus claims cover what a device is, not what a device does.” Hewlett-Packard Co. v. Bausch & Lomb Inc., 909 F.2d 1464, 1469, 15 USPQ2d 1525, 1528 (Fed. Cir. 1990) (emphasis in original).

Note additionally, applicant has failed to point out any special definition in the instant specification. The term "electrode" accordingly simply means an electrical conductor used to make contact with a nonmetallic part of a circuit, in this case the semiconductor material. As evident in Awano, electrical connection to the semiconductor substrate 202 is through the metal 222 and the carbon nanotubes elements 222A, thus clearly correspond to such electrode; as the terminal or electrode by applicant comprises the metal and the carbon nanotubes, in the similar order, namely, the carbon nanotube contacting the semiconductor material and the metal contacting the carbon nanotube.

Claims 22 and 26 are rejected under 35 U.S.C. 103(a) as being unpatentable over Awano and Webster as applied to claims 1, 2, 21, 23 above, and further in view of Horiuchi et al. 2002/0122765 A1.

Re claims 22, concerning the carbon nanotube to have higher conductivity than that of the organic material having a 6-membered ring, and claim 26 regarding the carbon nanotubes falling between 10^{-5} and 10^{-4} ohm-cm, such does not incorporate any additional structural limitations in the claim and does not impart patentability therein. These limitations correspond to an intended use or functional limitation and does not

require any additional structural limitations on the claimed apparatus. A recitation directed to the manner in which a claimed apparatus is intended to be used does not distinguish the claimed apparatus from the prior art – if the prior art has the capability to so perform. See MPEP 2114 and *Ex parte Masham,* 2 USPQ2d 1647 (1987). The recitation of a new intended use for an old product does not make a claim to that old product patentable. *In re Schreiber*, 44 USPQ2d 1429 (Fed. Cir. 1997). The recitation of a new intended use for an old product does not make a claim to that old product patentable. *In re Schreiber*, 44 USPQ2d 1429 (Fed. Cir. 1997). While features of an apparatus may be recited either structurally or functionally, claims directed to an apparatus must be distinguished from the prior art in terms of structure rather than function. In re Schreiber, 128 F.3d 1473, 1477-78, 44 USPQ2d 1429, 1431-32 (Fed. Cir. 1997) (The absence of a disclosure in a prior art reference relating to function did not defeat the Board's finding of anticipation of claimed apparatus because the limitations at issue were found to be inherent in the prior art reference); see also In re Swinehart, 439 F.2d 210, 212-13, 169 USPQ 226, 228-29 (CCPA 1971); In re Danly, 263 F.2d 844, 847, 120 USPQ 528, 531 (CCPA 1959). "[A]pparatus claims cover what a device is, not what a device does." Hewlett-Packard Co. v. Bausch & Lomb Inc., 909 F.2d 1464, 1469, 15 USPQ2d 1525, 1528 (Fed. Cir. 1990) (emphasis in original). Additionally, the functional recitation delineated (e.g., claim 22) and the value of the conductivity recited (in claim 26) is deemed to have been obvious given the teachings of Horiuchi et al. [0128] wherein carbon nanostructures are know to have very high conductivity and can be used as electrode, wiring, etc., and thus it would be expected

that such would have higher conductivity to the organic semiconductor materials. Additionally, such limitations and would be inherent or would logically follow when the similar and conventional organic material 6-membered ring is employed, e.g., conventional pentacene, etc., including those recited by Webster; such would have been further obvious and logically followed, since carbon nanatubes are well known to have very conductivity, [0218] and have been employed as electrode, electrical wiring, etc, thus its higher conductivity including the recited range would have been obvious. "[W]here the general conditions of a claim are disclosed in the prior art, it is not inventive to discover the optimum or workable ranges by routine experimentation." In re Aller, 220 F.2d 454, 456, 105 USPQ 233, 235 (CCPA 1955).

Alternatively, it would have been obvious to have employed suitable 6-membered carbon ring organic material of a desired conductivity, including that which has a lower conductivity than that of the carbon nanotubes. While features of an apparatus may be recited either structurally or functionally, claims directed to an apparatus must be distinguished from the prior art in terms of structure rather than function. In re Schreiber, 128 F.3d 1473, 1477-78, 44 USPQ2d 1429, 1431-32 (Fed. Cir. 1997) (The absence of a disclosure in a prior art reference relating to function did not defeat the Board's finding of anticipation of claimed apparatus because the limitations at issue were found to be inherent in the prior art reference); see also In re Swinehart, 439 F.2d 210, 212-13, 169 USPQ 226, 228-29 (CCPA 1971); In re Danly, 263 F.2d 844, 847, 120 USPQ 528, 531 (CCPA 1959). "[A]pparatus claims cover what a device is, not what a

device does." Hewlett-Packard Co. v. Bausch & Lomb Inc., 909 F.2d 1464, 1469, 15 USPQ2d 1525, 1528 (Fed. Cir. 1990) (emphasis in original).

Claims 24, 28, 30 are rejected under 35 U.S.C. 103(a) as being unpatentable over Awano taken with Webster as applied to claims 1, 2, 21, 23 above, and further in view of Zhou et al. 2003/0102222 A1.

Re claim 24 regarding the distance between the metal and the organic material, or the length of the carbon nanotube to be between 1 to 10 microns, re claim 28, wherein the length of the carbon nanotube is 20 micron or less, and re claim 30, wherein the length of the carbon nanotube is 5 to 20 microns, such selection of suitable dimensions would have been a matter of routine optimization to one skilled in the art and thus would have been obvious. It is well settled that changes in size, proportion or relative dimensions would not be sufficient to patentably distinguish over the prior art absence showing of persuasive evidence that the particular configuration was significant. *In re Rose* , 220 F.2d 459, 105 USPQ 237 (CCPA 1955); *In re Rinehart*, 531 F.2d 1048, 189 USPQ 143 (CCPA 1976) ("mere scaling up of a prior art process capable of being scaled up, if such were the case, would not establish patentability in a claim to an old process so scaled." 531 F.2d at 1053,189 USPQ at 148.).

Additionally, Zhou et al. teach conventional length of the carbon nanotube to be between 0.1 and 100 micron, and preferably 0.1 to microns, and more preferably 0.3 to 3 microns. See [0075].

Accordingly, the selection of such dimension of the carbon nano tubes to be 20 micron or less as in claim 28, or 30 and the distance between the metal and the organic

material of 1 to 10 micron as claimed in claim 24 (proximate the length of the carbonanotube) would have been conventional and obvious as shown in Zhou et al.

Claims 27, 22, and 26 are rejected under 35 U.S.C. 103(a) as being unpatentable over Awano taken with Webster as applied to claims 1, 2, 21, above, and further in view of Hirai et al. 2003/0211649 A1.

The prior art as applied does not recite the materials enumerated in claim 27. Webster further teaches anthracene, fullerene as the organic materials, page 431, last sentence. Hirai et al., [103]-[104] tech organic semiconductor materials for TFTs including various acenes [103] and derivaties, e.g., napthacene, pentacene, hexacene, heptacene, etc., various thiopenes and derivatives [103], e.g., polythiopenes, etc., fullerenes [104].

It would have been obvious to one skilled in the art in practicing the above invention to have enumerated these materials since such is conventional and advantageous for such applications as evidenced by Hirai et al.

Note that to the extent that the higher conductivity of carbon nanotubes compared to that of the organic material in claim 22 and the carbon nanotube conductivity being due to the selection of one of the above material, while the Office is not equipped to measure to relative difference in conductivity, such would follow when the materials above are employed as the organic material in question and carbon nanotubes employed in the terminal.

Applicant's arguments filed September 1, 2009 have been fully considered but they are not persuasive.

Applicant argues, page 7 first paragraph, that the carbon nanotubes employed in the instant application improve electrical conductivity. Such however would follow from the teachings above as the same carbon nanotubes materials would be employed. In addition, see column 8 lines 34-35 where improved conductivity is known as taught by Awano. In any event, the fact that applicant has recognized another advantage which would flow naturally from following the suggestion of the prior art cannot be the basis for patentability when the differences would otherwise be obvious. See *Ex parte Obiaya*, 227 USPQ 58, 60 (Bd. Pat. App. & Inter. 1985). See further Awano, column 8 line 31, wherein enhanced electrically conductive properties are also taught, and Horiuchi et al., 2002/0122765 A1, [0218] which evidences that it is well known that carbon nanotubes have very high conductivity.

Applicant argues that it is impossible to replace substrate 202 of Awano with an organic material having a 6-memebered carbon ring because the sublimation of the an organic material having a 6 membered ring is, e.g., 200 to 300° C, much lower than the growth temperature of the carbon nanotube, which applicant says to be 400°, relying on the Tsukagoshi declaration previously filed.

The declaration under 37 CFR 1.132 filed December 2, 2008 is insufficient to overcome the rejection of claims 1 and 2 based upon Awano in view of Webster as set forth in the last Office action.

The declaration has been carefully considered but is not deemed to be sufficient to overcome the rejection In particular, the declaration on the second page delineates that it is not possible to grow a carbon nanotube on a substrate of organic material

having 6-membered carbon rings since carbon nanotubes require an temperature of about 400° C to grow and that the organic material having a 6-membered carbon ring have a sublimation temperature of approximately 200° to 300° C.

This has been carefully considered together with all remaining evidence of obviousness. Nonetheless, this corresponds to an opinion while the subject matter encompassed corresponds to the physical characteristics of the materials and processes in question amenable to being supported or substantiated by empirical data or objective evidence which are presently lacking, namely objective evidence regarding the sublimation of the 6-membered carbon ring or the deposition temperatures requiring 400°C.

In any event, the invention is Awano is seen to be applicable to semiconductor devices having wirings including carbon nanotubes as delineated above and is not limited to a particular process or temperature. Awano, e.g., the abstract, recites that the device is **preferably** employed by method comprising a conventional CVD process but it is evident nowhere said that such method must be employed; and indeed, applicant has failed to show or point out that Awano must employ a CVD process. It remains that one skilled in the art would have found it obvious to employ conventional deposition in the above process including a selection of conventional deposition process that is suitable for the substrate material in question. See e.g., Kawakami 2005/0266605 A1, [0047], which evidence that nanocarbon materials can be formed by low temperature processes and Arthur et al. 6,988,925 B2, column 3 lines particularly column 4 lines 25-52, wherein it is evidenced that carbon nanotube wiring can be formed on various

alternative substrates without requiring any high temperatures. Furthermore, the instant claims do not preclude the CVD process for the formation of the layer in question.

Thus it remains apparent that Awano does not require deposition of the carbon nanotubes at 400°C or higher, and that the instant claims do not require the carbon nanotubes at lower than 400°.

Applicant argues that Handbook of Nano Carbon shows that the lowest temperature for growing a multilayer carbon nanotube is 400° C. Nonetheless, this characterization is not supported by the record and the reliance thereupon is misplaced. Note that there was no agreement on this characterization regarding any patentability. reached. The portion upon which applicant relies upon, the partial translation at page 346, lines 26-28, recites that ". . . . As is clear from Figure 2, good quality multilayer CNT was successfully grown at the low temperature of 400° C by applying nano-size catalyst particles." The reference nowhere says anything about Awano or any impossibity as alleged. Applicant fails to point where in the handbook of nano carbon that says anything about Awano or its processing and how it would be detrimental to the organic 6-membered ring substrate.

Furthermore, this fails to overlook that available processes suitable to the deposition of carbon nanotubes that nowhere requires temperatures of 400°. Again, Kawakami 2005/0266605 A1, [0047] clearly evidence one need not exclude all use of nanocarbon materials if temperatures can be a problem since it clearly teaches that nanocarbon materials can be formed by low temperature processes and Arthur et al. 6,988,925 B2, column 3 line 1 to column 9 line 48, particularly column 4 lines 25-52

clearly evidence the same, wherein it is evidenced that carbon nanotube wiring can be formed on various alternative substrates without imposing detrimental temperatures. See also Horiuchi et al. [0218] wherein usage of carbon nanotubes that does not require high temperatures and includes advantages such as higher densities in ICs, finer resolution, usage as electrode, lead wires, wiring, as well as very high conductivity is taught. It remains that such alternative deposition would have been advantageous and obvious.

Applicant further argues that in the instant application the carbon nanotube is grown on the metal thus works and that in Awano the carbon nanotubes are grown on the substrate and thus do not work. This has been considered but is not deemed to be persuasive since this corresponds to arguments or speculation and are not supported by the specification which nowhere shows that the Awano's invention cannot work because it employs deposition of the carbon nanotubes on the substrate material as opposed to on the metal. There was no agreement during the interview regarding this as basis of patentability. The instant claims further are not limited to the carbon nanotubes to form on the metal, and followed by deposition of the organic material on the carbon nanotubes.

Applicant argues that the obviousness grounds cannot be sustained by mere conclusory statements. This however does not take into consideration the fact that Awano nowhere is limited to silicon as the substrate material but is applicable to semiconductor materials and does not exclude or preclude any particular or suitable semiconductor material; it remains that the use of the conventional and advantageous

organic material in question as evidenced by Webster would have been obvious, wherein such materials are known to have high electronic conductivity, and to be light weight, flexible, conformable, and produced by simple and inexpensive processes.

Applicant further argues that in Awano et al. the carbon nanotubes do not work as an electrode. This however overlooks the fact that the conductor in Awano et al. employ both the metal 200 and the carbon nanotubes as the conductor for electrical connection to the semiconductor material. Indeed, see column 8 line 56 to column 9 line 1, wherein its capability to allow high current density to pass through. Applicant further fails to point out any special definition regarding the electrode in the instant specification. Furthermore, as shown in Horiuchi et al. [0218], carbon nanostructures can be employed as electrode, electrical wiring, etc., including having very high conductivity.

Applicant further argues that the carbon nanotube having higher electroconductivity than that of the organic material thus is different than that of Awano. However this overlooks that such high conductivity is well known and forms the basis for its use as the electrode or wiring material whereas the organic materials correspond to semiconductor materials and thus would follow that carbon nanotubes having higher conductivity. See Horiuchi et al. above wherein such high conductivity is expected of carbon nanotubes.

Applicant further argues that the carbon nanotube of Awano does not contact the metal and organic material because Awano employs a catalyst, column 17, lines 27-31. Nonetheless, such catalyst can be removed if desired, column 17 lines 31-32. The

catalyst is nowhere required or present in the structures of Awano, see, e.g., Figs. 2A-4, 18A-20B, column 23 line 50 et seq.

Regarding the argument that the sublimation or decomposition of the substrate, the response above with regard to the declaration would be applicable here as well.

In view of the foregoing, when all of the evidence is considered, the totality of the rebuttal evidence of nonobviousness fails to outweigh the evidence of obviousness.

The prior art made of record and not relied upon is considered pertinent to applicant's disclosure. The Wikipedia article on electrode is made of record.

Applicant's amendment necessitated the new ground(s) of rejection presented in this Office action. Accordingly, **THIS ACTION IS MADE FINAL**. See MPEP § 706.07(a). Applicant is reminded of the extension of time policy as set forth in 37 CFR 1.136(a).

A shortened statutory period for reply to this final action is set to expire THREE MONTHS from the mailing date of this action. In the event a first reply is filed within TWO MONTHS of the mailing date of this final action and the advisory action is not mailed until after the end of the THREE-MONTH shortened statutory period, then the shortened statutory period will expire on the date the advisory action is mailed, and any extension fee pursuant to 37 CFR 1.136(a) will be calculated from the mailing date of the advisory action. In no event, however, will the statutory period for reply expire later than SIX MONTHS from the date of this final action.

Any inquiry concerning this communication or earlier communications from the examiner should be directed to examiner Tuan Quach whose telephone number is 571-272-1717. The examiner can normally be reached on M-F from 8:00 AM to 4:00 PM.

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor Davienne Monbleau can be reached on 571-272-1945. The fax phone number for the organization where this application or proceeding is assigned is 571-273-8300.

Information regarding the status of an application may be obtained from the Patent Application Information Retrieval (PAIR) system. Status information for published applications may be obtained from either Private PAIR or Public PAIR. Status information for unpublished applications is available through Private PAIR only. For more information about the PAIR system, see http://pair-direct.uspto.gov. Should you have questions on access to the Private PAIR system, contact the Electronic Business Center (EBC) at 866-217-9197 (toll-free). If you would like assistance from a USPTO Customer Service Representative or access to the automated information system, call 800-786-9199 (IN USA OR CANADA) or 571-272-1000.

/Tuan N. Quach/
Primary Examiner, Art Unit 2893